REMARKS

Claims 1-29 are in the application, of which Claims 1, 8, 15, and 27 are the independent claims. Claims 1-6, 8, 10, 11, 15, 17, 27, and 28 are amended herein, and new Claim 29 is added herein. Reconsideration and further examination are respectfully requested.

Initially, Applicants thank the Examiner for the thoughtful courtesies extended during the telephonic interview held on April 16, 2008. During the interview, Applicants' representative discussed the claim amendments, as presented herein, and U.S. Patent Appl. Pub. No. 2003/0014212 (Ralston). The substance of the interview is incorporated into this paper. Applicants thank the Examiner for an indication that the amendments would overcome the rejections under 35 U.S.C. § 102 and 35 U.S.C. § 103 and the rejections under 35 U.S.C. § 101.

No new matter is believed to have been introduced to the application by this amendment. The changes to the claims are fully supported by the disclosure, including, for example, the original claims, FIG. 1, and paragraphs [0013], [0018], [0029], [0031], and [0040].

Rejections Under 35 U.S.C. § 112

In the Office Action, Claims 1-28 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicants submit that the claims as amended herein fully comply with § 112, second paragraph. Reconsideration and withdrawal of the § 112, second paragraph rejection is respectfully requested.

Rejections Under 35 U.S.C. § 101

Claims 1-7 and 27-28 were rejected under 35 U.S.C. § 101, as being directed to non-statutory subject matter. Applicants thank the Examiner for the indication that the

amendments would overcome the rejections under 35 U.S.C. § 101. Reconsideration and withdrawal of the § 101 rejection is respectfully requested.

Rejections Under 35 U.S.C. § 102 & § 103

Claims 1, 3-5, 7-9, 10-12, 14-15, 17-18, 21-25 and 27-28 were rejected under 35 U.S.C. § 102(e) by U.S. Patent Appl. Pub. No. 2003/0014212 (Ralston); and Claims 2, 6, 9, 13, 16, 19, 20 and 26 were rejected under 35 U.S.C. § 103(a) over Ralston in view of Virtual Object Manipulation on a Table-Top AR Environment (Kato). Reconsideration and withdrawal of these rejections are respectfully requested.

The present invention generally concerns augmented reality for space-based phenomena. With reference to particular claim language, independent Claim 1 is directed a visualization system for developing a three-dimensional representation of a space system. The system comprises a processor or a tangible medium, which comprises a positioning portion, a modeling portion, a model specification portion, and an output portion. The positioning portion is configured to determine a position of a viewer with respect to a real world and a position of the viewer with respect to a virtual world. The positioning portion is configured to allow the viewer to interact with the virtual world.

The modeling portion is configured to specify the virtual world in response to a space system model of the virtual world. The space system model includes models for the earth and satellites. The model specification portion is configured to specify a representation of satellite model status data of the satellites in response to the position of the viewer with respect to the virtual world and in response to satellite model status data of the satellites.

The output portion is configured to provide a three-dimensional representation of a space system. The three-dimensional representation of the space system includes an image of the virtual world super-imposed on an image of the real world. The image of the virtual world includes the representation of the satellite model status data of the satellites to the viewer in response to the position of the viewer with respect to the virtual world. The representation of the satellite model status data of the satellites includes a three-dimensional representation of satellite orbits. The image of the virtual world includes a three-dimensional representation of the models for the earth and the satellites.

The representation of the satellite model status data of the satellites further comprises a representation selected from the group: satellite sensor orientation, satellite sensor position, and satellite system design data.

Independent Claim 8 is directed to a method for visualization of augmented reality to develop a three-dimensional representation of a space system. The method comprises: determining a position of a viewer with respect to a real world and a position of the viewer with respect to a virtual world; determining a space system model of the virtual world, the space system model including models for the earth and satellites; and determining a representation of satellite model status data of the satellites in response to the position of the viewer with respect to the virtual world and in response to satellite model status data of the satellites

The method further comprises displaying to the viewer a three-dimensional representation of a space system. The three-dimensional representation of the space system includes a representation of the virtual world super-imposed on a representation of the real world. The representation of the virtual world includes the representation of the satellite model status data of the satellites in response to the position of the viewer with respect to the virtual world. The

representation of the satellite model status data of the satellites includes a three-dimensional representation of satellite orbits. The image of the virtual world includes a three-dimensional representation of the models for the earth and the satellites.

The representation of the satellite model status data of the satellites further comprises a representation selected from the group: satellite sensor orientation, satellite sensor position, and satellite system design data.

Independent Claim 15 is directed to a visualization method for developing a three-dimensional representation of a space system. The method comprises: determining a space system model of a virtual world. The space system model includes models for the earth and satellites; determining a representation of satellite model status data of the satellites in response to satellite model status data of the satellites, and in response to a position of a viewer with respect to the virtual world; and determining a representation of the virtual world in response to the space system model of the virtual world and in response to a position of the viewer with respect to the virtual world.

The method further comprises displaying to the viewer a three-dimensional representation of a space system. The three-dimensional representation of the space system includes a representation of a real world overlaid with the representation of the virtual world. The representation of the virtual world includes the representation of the satellite model status data of the satellites. The representation of the satellite model status data of the satellites includes a three-dimensional representation of satellite orbits. The representation of the virtual world includes a three-dimensional representation of the models for the earth and the satellites

The method further comprises: selecting one of the satellites, by the viewer, to view satellite model status data of the selected one of the satellites; and directing the selected one of the

satellites, by the viewer, to move to a different position. The viewer is allowed to interact with the virtual world.

Independent Claim 27 is directed to a visualization system for developing three-dimensional representation of a space system. The system comprises a processor or a tangible medium, which comprises a positioning portion, a modeling portion, a model specification portion, an output portion, and an input portion. The positioning portion is configured to determine a position of a viewer with respect a real world and a position of the viewer with respect to a virtual world. The positioning portion is configured to allow the viewer to interact with the virtual world.

The modeling portion is configured to specify the virtual world in response to a space system model of the virtual world. The space system model includes models for the earth and satellites. The model specification portion is configured to specify a representation of satellite model status data of the satellites in response to the position of the viewer with respect to the virtual world and in response to satellite model status data of the satellites.

The output portion is configured to provide a three-dimensional representation of a space system. The three-dimensional representation of the space system includes an image of the virtual world super-imposed on an image of the real world. The image of the virtual world includes the representation of the satellite model status data of the satellites to the viewer in response to the position of the viewer with respect to the virtual world. The representation of the satellite model status data of the satellites includes a three-dimensional representation of satellite orbits. The image of the virtual world includes a three-dimensional representation of the models for the earth and the satellites.

The input portion is configured to allow the viewer to select one of the satellites to view

satellite model status data of the selected one of the satellites and is configured to allow the viewer to direct the selected one of the satellites to move to a different position.

Turning to the applied references, Ralston is directed to an augmented vision system for a survey operation. Ralston discloses that in real time techniques, an actual position is determined and recorded at each point during a survey. Five satellites are required for initialization. See Ralston, paragraph [0004]. The satellite positions are monitored closely from earth and act as reference points, from which an antenna receiver in the field is able to determine position information. By measuring the travel time of signals transmitted from a number of satellites, the receiver is able to determine corresponding distances from the satellites to the antenna phase center, and then the position of the antenna by trilateration. See Ralston, paragraph [0005]. Ralston can display satellites to assist the operator. See Ralston, FIG. 25 and paragraphs [0090] and [0091].

Ralston, however, does not disclose or suggest a visualization system or method for developing a three-dimensional representation of a space system for providing a space system model including models for the earth and satellites (see Claims 1, 8, 15 and 27), specifying or determining a representation of satellite model status data of the satellites in response to a position of a viewer with respect to the virtual world and in response to satellite model status data of the satellites (see Claims 1, 8, 15 and 27), providing a representation of the satellite model status data of the satellites including a three-dimensional representation of satellite orbits (see Claims 1, 8, 15 and 27), providing an image of the virtual world including a three-dimensional representation of the models for the earth and the satellites (see Claims 1, 8, 15 and 27), providing a representation of the satellite model status data of the satellites including a representation selected from the group: satellite sensor orientation, satellite sensor position, and satellite system design data (see

Claims 1 and 8), and allowing a viewer to select one of the satellites to view satellite model status data of the selected one of the satellites and allowing a viewer to direct the selected one of the satellites to move to a different position (see Claims 15 and 27).

Ralston is not related to a space system including a three-dimensional model of the earth and satellites and allowing a viewer to move the satellites so that the viewer can view various different three-dimensional model representations of the space system. See also Appendix A submitted with a response dated April 12, 2007, which provides an exemplary graphical illustration. In the present invention, satellite information such as the satellite orbits, satellite sensor orientation, satellite sensor position, or satellite system design data is used for the three-dimensional modeling of the earth and satellites.

Ralston is understood to perform a survey operation and determine position information based on the satellites. In Ralston, an operator is simply allowed to observe the location of a satellite and where it is moving so that the operator can accurately determine position information based on the satellites. The operator cannot and does not move the satellites. The operator has no control over the satellites. Ralston is not understood to create various different three-dimensional model representations of a space system, including a three-dimensional model of the earth and satellites.

Specifically, Ralston states: "One of the satellites coded "S9" lies in a solid angle indicated by a circle 1211 and is moving relative to the operator in a direction indicated by arrow 1216." Ralston, paragraph [0090]. This allows an operator to merely observe the movement of a satellite; the operator cannot move the satellites. Furthermore, this does not disclose or suggest satellite orbits.

Ralston discloses "a calibration function by which the operator may adjust an offset in the display 415 to align virtual objects more closely with their corresponding real objects if required." Ralston, paragraph [0061]. This allows an operator to align virtual objects (such as electricity lines) to real objects. This, however, does not disclose or suggest that an operator can move satellites. As explained earlier, an operator can merely observe the movement of a satellite to obtain accurate position information; an operator cannot move a satellite.

Kato does not remedy the foregoing deficiencies of Ralston. Kato discloses playing cards utilizing augmented reality. See Kato, section 3. Like Ralston, Kato, fails to disclose or suggest the claimed features of the invention.

Accordingly, the applied references, either alone or in combination, are not understood to disclose, teach, or suggest the features of independent Claims 1, 8, 15 and 27, which are believed to be in condition for allowance.

The other claims currently under consideration in the application are dependent from independent Claim 1, 8, 15 or 27 discussed above and therefore are believed to be allowable over the applied references for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience. Applicants' undersigned attorney may be contacted at the address and telephone number set forth below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 501216 and please credit any excess fees to such deposit account.

Respectfully submitted,

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